THE NORTH AMERICAN SPECIES OF BARBAREA.

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A recent attempt to determine satisfactorily some specimens of *Barbarea* from different regions of North America has led the writer to make a somewhat detailed study of the genus. In the course of this study it has become apparent that the species, which are notoriously difficult of delimitation, have more definite characters of foliage and fruit than we have generally supposed, and that in some cases our interpretation must be changed by a more accurate knowledge of certain of the older species. In the interpretation of the European species the writer has gained much assistance from the treatment of the genus and the critical notes of Rouy & Foucaud [1] and the earlier observations of Des Moulins.[2]

As commonly interpreted, *Barbarea* in America consists of *B. vulgaris* R. Br. (including *arcuata*) with divergent or arcuate-ascending pods, introduced eastward but said to be indigenous from Lake Superior northward and westward; *B. stricta* Andrz., with closely appressed pods, occurring across boreal America and coming south to Virginia, the Great Lake region, Missouri, and along the Rocky Mts.; and *B. verna* (Mill.) Asch. (*B. praecox* Sm.), an introduced garden-plant. Recently, however, Dr. Rydberg has characterized the plant of the Rocky Mts. as *B. americana*.

An inspection of all the American material in the Gray Herbarium and the herbarium of the New England Botanical Club shows that our Barbareas fall into two rather clearly marked groups. The first group consists of plants which are represented in these collections only by specimens from the older settled portions of America (chiefly in the East) and which, although now naturalized, were probably introduced from Europe. In all these plants the beak of the silique, formed by the persistent style, is very slender and elongate (2–3 mm. long) and the uppermost leaves of the stem are coarsely dentate, angulate, or lobed, but very rarely pinnatifid. These plants include the introduced *Barbarea vulgaris*; another probably introduced plant which has been passing in the Eastern States as *B. stricta*; and a singular short-

[1] Fl. de France, i. 196–203 (1893).

[2] Catalogue raisonné des Phanérogames de le Dordogne, 2e. fasc. du Suppl., 20–54 (1849).

podded plant from Seattle, Washington, which is specially commented upon in the Synoptical Flora.

The second group is typified by the sometimes cultivated European *Barbarea verna* (Mill.) Asch. (*B. praecox* Sm.), the silique of which has a characteristically short broad beak (0.5–2 mm. long) and the cauline leaves of which are lyrate-pinnatifid. Besides this introduced *B. verna*, however, we have in America a number of well marked indigenous plants with short thick beaks and usually lyrate-pinnatifid upper leaves. The most widely distributed of these is the plant named by Dr. Rydberg *B. americana*, but taken by many other recent authors to be indigenous forms of both *B. vulgaris* and *B. stricta*.

The relationships and identities of certain of these plants demand special consideration and they may be most appropriately discussed in the order mentioned in the two groups above.

Barbarea vulgaris, the common introduced plant of the East, is fairly well understood, but the status of *B. arcuata* Reichenb., sometimes distinguished as a subspecies or a variety from *B. vulgaris* is more doubtful. *B. arcuata* is often separated, at least varietally, by the slightly larger flowers which are more loosely disposed in anthesis, the slightly arcuate and more slender siliques, and the narrower seeds; but in the American specimens examined these characters do not seem sufficiently marked to make it clear that we have two different plants.

The plant which has been passing in the eastern United States as *Barbarea stricta* Andrz. differs, as already intimated, from the more northern indigenous plant which has been identified with it in the longer slender beak of the pod and the angulate or coarsely toothed but rarely pinnatifid upper leaves. This plant of the Eastern States, like *B. vulgaris*, is found chiefly in the neighborhood of settlements, and though it is commonly recognized by its closely appressed and crowded siliques it is often found with some of the pedicels spreading in such a way as to suggest *B. vulgaris*. With its foliage, siliques, and beaks essentially as in *B. vulgaris*, and differing only in having the siliques closely appressed, this plant seems more appropriately considered a variety of the latter species than specifically distinct. But that the plant is really *B. stricta* Andrz., with which it has generally been identified, is very improbable. True *B. stricta* of Europe (*B. parviflora* Fries) as shown by specimens from Fries, Blomberg, Andersson, and Heimerl and as treated by recent European writers on the genus, is a plant of northern and northeastern Europe with the upper

cauline leaves oval, crenate, and slightly if at all lyrate or angulate, and the stoutish beak of the silique only 0.5–1 mm. long. Our common plant of the East which has passed as *B. stricta* has the upper cauline leaves coarsely angulate-dentate and the beak of the silique is rather slender and 2–3 mm. long. In these characters it matches material from England and western and central Europe which has been erroneously passing as *B. stricta*, but which is treated by Rouy & Foucaud as *B. vulgaris*, subsp. *vulgaris*, var. *longisiliquosa* Carion.

The other plant with elongate slender style, the plant from Seattle, Washington, specially noted in the Synoptical Flora [1] on account of its very short siliques, is apparently the var. *brachycarpa* of Rouy & Foucaud.

Of the plants of the second group, i. e., those with the upper cauline leaves mostly lyrate-pinnatifid and with short thick styles, *Barbarea verna* (*B. praecox*) needs no discussion. The indigenous species, however, demand special comment. The most broadly distributed of these has short thickish pedicels and is the plant thought by early students of our flora to be identical with the European *B. praecox* (*B. verna*). Richardson, Chamisso & Schlechtendal, Sir Wm. Hooker, Torrey & Gray, and their contemporaries all considered it *B. praecox*, Hooker separating it from *B. vulgaris* by the "*stigma* short, nearly as broad as the valve." [2] Nuttall apparently considered it a distinct species, his *B. gracilis*,[3] from "Oregon," but subsequent authors have generally identified it with the European *B. vulgaris* or *B. stricta*. From *B. verna* (*B. praecox*), to which the indigenous plant is very closely related, it differs in its basal leaves; those of the former plant having very numerous small leaflets, those of our northern species very few or none. From *B. vulgaris* and its variety *longisiliquosa* our plant is quickly separated by the characters already emphasized. From true *B. stricta* the plant is readily distinguished by its much longer pods and by the narrower more lyrate-pinnatifid upper leaves. Recently this distinct plant with "pod 2–2.5 cm. long and scarcely 2 mm. wide, slightly angled, ascending, or at first nearly erect, on pedicels 2–3 mm. long; style very short, scarcely 0.5 mm. long," [4] has been named by Rydberg *B. americana*. The plant

[1] Robinson in Gray, Syn. Fl. i. fasc. 1. 150 (1895).
[2] Hook, Fl. Bor.-Am. i. 40 (1829).
[3] Nutt. ex Torr. & Gr. Fl. i. 75 (1838).
[4] Rydb. Mem. N. Y. Bot. Gard. i. 174 (1900).

covered by his description varies in the degree to which the pods are appressed, but as Rydberg's description indicates, there is no clear line to separate these minor variations. As described by Rydberg his *B. americana* occurs from "Northwest Territory" to Montana and Nevada; but the plant is widely distributed in our boreal and mountain regions, occurring from Ungava Bay, Labrador, south to river-banks and mountain-ravines of northern New England, northwestward to arctic Alaska, the Aleutian Islands, and adjacent northeastern Asia, and southward in western America to Colorado, and southern California. But clearly defined as is this plant, which is so typically a species of our boreal flora, it seems to have had but one well established name (excluding the doubtfully published *B. gracilis* of Nuttall [1]) prior to that assigned to it by Rydberg. In 1824, Ledebour published the Siberian *B. orthoceras* [2] with the pedicels of the siliques erect. Material of this species collected in Amur by Maximowicz is quite identical in basal and cauline leaves, strongly ascending pods, and short thick styles with American material which has been determined by Dr. Rydberg as *B. americana*; and there seems no reason why the name *B. orthoceras* Ledeb. should not be taken up for the plant which, widely distributed in our boreal and montane regions, extends, like so many of our other plants, by way of the Aleutian Islands and northwestern Alaska to the northeastern regions of Asia.[3]

In the southern part of its range *Barbarea orthoceras* is less characteristic than northward, the siliques tending to be longer, more divergent, and somewhat remote instead of strongly ascending or appressed and forming a dense slender raceme. Many transitional tendencies occur, however, and the longer-podded extreme seems best considered a variety of *B. orthoceras*, standing in the same relation to it as *B. vulgaris* to its var. *longisiliquosa*.

Another indigenous species, of unusual interest because of its peculiar habit of bearing in the lower part of the primary racemes leafy bracts

[1] Nuttall apparently did not formally publish *Barbarea gracilis* though it is ascribed to him by Torrey & Gray with the remark that "Mr. Nuttall thinks that the var. β [var. *gracilis* from "Oregon"] is a distinct species which he calls *B. gracilis*. Nuttall's plant, labeled distinctly in his own handwriting "*Barbarea gracilis*. *B vulgaris*, β. *gracilis* DC. Oregon woods." is in the Gray Herbarium and has been re-labeled by Dr. Rydberg "*B. americana* Rydb. P. A. R."

[2] Ledeb. Hort. Dorp.(1824) and Fl. Ross i. 114 (1841).

[3] It is probable that *Barbarea orthoceras* occurs across the colder regions of Eurasia to arctic Europe. Rouy & Foucaud, discussing the European species say: "La forme des régions arctiques est le *B. orthoceras* Ledeb."; and Nyman's Conspectus and the Index Kewensis treat Fellman's *B. stricta* from Lapland as *B. orthoceras*.

which subtend the flowers, is confined to the southern Alaskan and Aleutian region, extending by way of the Aleutian Islands to the coast and islands of Kamchatka and Amur. This distinct plant, which, in the presence of well developed floral bracts suggests the local *Barbarea bracteosa* Guss. of Sicily and the Neopolitan district, differs from that southern plant in many details. It seems, with little question, to be C. A. Meyer's *B. planisiliqua*, originally described from the region of the Ochotsk Sea but stated by Tiling in his more detailed account of the plant to occur also on Unalaska.[1] The citation of *B. planisiliqua* from Unalaska is significant since, of the numerous specimens of *Barbarea* examined from Alaska, only one species — the plant under discussion — has been found from Unalaska. During the Jaggar Expedition to the Aleutian Islands in 1907 Dr. Edwin C. Van Dyke collected both *B. orthoceras* and the plant with leafy-bracted inflorescence; and it is notable that he, like earlier collectors, found on Unalaska only the latter species.

The conclusions reached in this study of *Barbarea* in North America may be summarized as follows.

* Beak of the silique slender, 2–3 mm. long: uppermost leaves incised, coarsely dentate, angulate, or lobed, but rarely pinnatifid.

BARBAREA VULGARIS R. Br. Glabrous throughout: radical and lower cauline leaves green, rarely purple-tinged, usually pinnatifid; the terminal lobe large, suborbicular to elliptic-oblong; lateral lobes 2–4 pairs (rarely none), the upper pair larger than the lower: middle leaves lyrate-pinnatifid: uppermost leaves obovate or oblong, coarsely dentate or angulate above the middle, often incised but scarcely pinnatifid below: flowers orange-yellow, showy: siliques 2–3(–4) cm. long, subterete to quadrangular, on more or less divergent or spreading-ascending slender pedicels.— R. Br. in Ait. Hort. Kew. ed. 2, iv. 109 (1812); Am. auth., as to the introduced plant of the East. *Eyrsimum Barbarea* L. Sp. Pl. ii. 660 (1753). *Sisymbrium Barbarea* Crantz, Stirp. Austr. fasc. i. 54 (1769). *Erysimum lyratum* Gilib. Fl. Lith. ii. 59 (1782). *B. taurica* DC. Syst. ii. 207 (1821).[2] *B. arcuata* Reichenb. Flora, v. 296 (1822).[1] *B. vulgaris*, γ. *arcuata* Fries, Novit. Fl. Suec. 205 (1828); Gray, Man. ed. 2, 35 (1856) in part. *B. lyrata*

[1] "Ich sah Pflanzen aus verschiedenen Gegenden Ost-Sibiriens, aus Kamtschatka, von den Kurilen und aus Unalaschka" — Regel & Tiling, Fl. Ajan. 46 (1858).

[2] *Barbarea taurica* and *B. arcuata* are treated by Old World students of the genus as identical, and by many the plant (under the name *B. arcuata*) is kept separate from *B. vulgaris*. If such separation is maintained the name *B. taurica*, it should be noted, will have to be used instead of *B. arcuata*, which was published in the succeeding year.

Asch. Fl. Brandenb. i. 35 (1864).[1] *B. Barbarea* [as *barbarea*] MacMillan, Met. Minn. Val. 259 (1892). *Campe Barbarea* [as *barbarea*] W. F. Wight in Piper, Contrib. U. S. Nat. Herb. xi. 303 (1906) as to synonyms but not as to plants cited.— Brooksides, meadows, roadsides, and waste places, chiefly near settled regions, abundantly naturalized from Eurasia; New England to Michigan, Kansas, and Virginia.— A double-flowered form is established about the city of Quebec.[2]

Var. **hirsuta** (Weihe), n. comb. Basal leaves and often upper leaves and stem hirsute.— *B. hirsuta* Weihe, Flora, xiii. 257 (1830). *B. vulgaris, β. bracteata*, sub-var. *hirsuta* Rouy & Foucaud, Fl. Fr. i. 198 (1893) — Introduced in fields at North Berwick, Maine (*Parlin*).

Var. BRACHYCARPA Rouy & Foucaud. Foliage as in typical *B. vulgaris*: siliques 1–1.5 cm. long.— Fl. Fr. i. 198 (1893). *B. stricta*, form, Robinson in Gray, Syn. Fl. i, fasc. i, 150 (1895). *Campe stricta* W. F. Wight in Piper, Contrib. U. S. Nat. Herb. xi. 303 (1906) as to plant, but not as to name-bringing synonym.— Introduced at Seattle, Washington (*Piper*).

Var. LONGISILIQUOSA Carion. Foliage as in *B. vulgaris*: siliques closely appressed to the rhachis, 2–3 cm. long.— *B. vulgaris*, subsp. *B. rivularis. β. longisiliquosa* Carion, Pl. Saône-et-Loire, 16 (1859) according to Rouy & Foucaud, Fl. Fr. i. 199 (1893) — original description not seen. *B. vulgaris*, var. *stricta* Gray, Man. ed. 2, 35 (1856) and subsequent authors, in part, not Regel. *B. stricta* Bor. Fl. Centre de la Fr. ii. 48 (1840); Robinson in Gray, Syn. Fl. i. fasc. i. 150 (1895) as to the eastern plant in great part, not Andrz.— Naturalized from eastern Quebec to Michigan, Missouri, and Virginia.

* * Beak thickish, 0.5–1 (rarely 2) mm. long: uppermost leaves usually lyrate-pinnatifid.

+ Basal leaves with numerous (10–20) lateral leaflets.

B. VERNA (Mill.) Asch. Leaves all pinnatifid; the basal with rounded-oval or -oblong terminal lobe and numerous smaller lateral lobes: petals 6–8 mm. long, bright yellow: pedicels 3–8 mm. long, as

[1] *Barbarea lyrata* Asch. was based on *Erysimum lyratum* Gilib. (1782), a name which antedates the maintained *Barbarea vulgaris* R. Br. (1812) by thirty years. But by Article 48 of the Vienna Code "the first specific epithet . . . .must be retained or must be re-established, unless, in the new position there exists one of the obstacles indicated in the articles of section 7." and by Article 51 (1). " Every one should refuse to admit a name . . . .when the name is applied in the plant kingdom to a group which has an earlier valid name." Our plant as an *Erysimum* already had the valid name *Erysimum Barbarea* L. (1753). therefore the specific name *lyratum* is inadmissible. For discussion of this principle of 'still-born (*totgeborenen*)" names see Schinz & Thellung, Bull. Herb. Boiss. Sér. 2, vii. 101 (1907). also circular-letter of 10 December, 1907; and Rendle & Britten, Journ. Bot. xlv 433 (1907).

[2] In June, 1895 Dr. B. L. Robinson collected at Waverly, Massachusetts, a plant which closely simulates the Asiatic *B. plantaginea* DC., but its immature condition renders it unwise so to name it with positiveness. *B. plantaginea*, which appears only varietally separable from *B. vulgaris* has all but the lowermost leaves elliptic or oblong and merely dentate, the principal cauline leaves of *B. vulgaris* (excluding the uppermost) being lyrate-pinnatifid.

thick as the long (4–8 cm.) slightly flattened rigid ascending siliques.— Fl. Brandenb. 36 (1864). *Erysimum vernum* Mill. Dict. ed. 8, no. 3 (1768). *Erysimum praecox* Sm. Fl. Brit. ii. 707 (1800). *B. praecox* R. Br. in Ait. Hort. Kew. ed. 2, iv. 109 (1812).— Somewhat cultivated as a salad under the names BELLE ISLE CRESS, EARLY WINTER CRESS, and SCURVY GRASS, and locally naturalized in the Eastern and Southern States.

+– +– Basal leaves simple or with 2–6 lateral leaflets.

++ Stems or branches leafy only to the base of the finally elongate racemes.

B. ORTHOCERAS Ledeb. Grabrous, strict, the stem and lower leaves often purple-tinged: basal leaves oblong or elliptic, simple or with 2 or 4 small lateral leaflets: lower and middle cauline leaves more decidedly lyrate-pinnatifid, ordinarily with 4–12 small leaflets: uppermost oblong or narrowly obovate, lyrate-pinnatifid, with few basal lobes: racemes in anthesis densely flowered, in fruit elongate and slender: sepals pale: petals pale yellow, 2.5–5 mm. long: siliques subterete or compressed, not conspicuously angled, 2–3.5 cm. long, somewhat crowded, strongly ascending or appressed, on thick pedicels 3–8 mm. long.— Hort. Dorp. (1824), and Fl. Ross i. 114 (1841). *B. praecox* Richardson, Frankl. Jour. App. 15 (1823); Hook. Fl. Bor.-Am. i. 39 (1829); T. & G. Fl. i. 75 (1838); not Sm. *B. vulgaris*, *β. gracilis* T. & G. l. c. (1838), perhaps not DC. *B. gracilis* Nutt. ex T. & G. l. c. (1838). *B. vulgaris*, var. *stricta* Gray, Man. ed. 2, 35 (1856) and subsequent Am. auth. in part, not Regel. *B. stricta* Fellm. Pl. Vasc. Lapp. 6 (1864–1869); Robinson in Gray, Syn. Fl. i. fasc. i. 150 (1895) in part ; not Andrz. *B. Barbarea* [as *barbarea*], var. *stricta* MacMillan, Met. Minn. Val. 259 (1892) in part, but not as to name-bringing synonym. *B. americana* Rydb. Mem. N. Y. Bot. Gard. i. 174 (1900). *Campe Barbarea* [as *barbarea*] W. F. Wight in Piper, Contr. U. S. Nat. Herb. xi. 303 (1906) in part, but not as to name-bringing synonym.— Banks of streams or in swamps, northern Labrador to northwestern Alaska, south to the St. John River, Maine, Mt. Washington, New Hampshire, shores and islands of Lakes Huron and Superior, Colorado, and southern California; also from northeastern Asia to arctic Scandinavia. Passing by numerous gradations to

Var. **dolichocarpa,** n. var., siliquis patulis vel adscendentibus remotis vel subremotis subincurvis 2.5–5 cm. longis.— Siliques spreading or ascending, remote or subremote, somewhat incurved, 2.5–5 cm. long.— British Columbia to Wyoming, south to Lower California and central Mexico. Type collected on wet ground in woods, western Klickitat Co., WASHINGTON, May 19 and July, 1891 (*W. N. Suksdorf*, no. 2022). Some other numbered specimens are WYOMING, Union Pass, August 10, 1894 (*A. Nelson*, no. 864): CALIFORNIA, near summit of Mt. Sanhedrin, Lake Co., July 20, 1902 (*A. A. Heller*, no. 5925): ARIZONA, vicinity of Flagstaff, altitude 7000 feet, June 1, 1898 (*D. T. MacDougal*, no. 24): MEXICO, Cuantillan, Valley of Mexico, May 13, 1899 (*C. G. Pringle*, no. 7740).

++ ++ Lower pedicels of the comparatively short and thick raceme subtended by leafy bracts.

B. PLANISILIQUA C. A. Meyer. Similar to *B. orthoceras* but with the shorter racemes bearing during anthesis 4–8 conspicuous lyrate-pinnatifid leafy bracts, which are somewhat deciduous in the mature plant; the sepals deeper-colored or purple-tinged; the petals 7–9 mm. long; the secondary racemes corymbiform; and the flattish ascending or erect siliques on comparatively slender pedicels and with more pronounced subconical beak.— C. A. Meyer in Middendorff, Reise, i. pt. 2, 14 (1856); Regel & Tiling, Fl. Ajan. 45 (1858). *B. vulgaris*, var. *arcuata* Robinson in Gray, Syn. Fl. i. fasc. i. 149 (1895) as to Alaskan plant, not Fries.— Southern Alaska and the Aleutian Islands to Kamtchatka and Amur. In its distribution very typical of the range of a considerable portion of the Aleutian flora —*Erigeron salsuginosus* (Richardson) Gray, var. *unalaschcensis* (Less.) Macoun, *Arnica unalaschcensis* Less., *Hieracium triste* Cham., &c.— which occurs from southern Alaska through the Aleutian Islands to the islands or mainland of Kamtchatka or Amur.

GRAY HERBARIUM.

STATUS OF EPILOBIUM ALPINUM AND EPILOBIUM HORNEMANNI.

ALBERT HANFORD MOORE.

While studying the alpine willow herbs from the White Mountains in connection with a flora of Coös County upon which Prof. Arthur Stanley Pease and the writer are engaged, I found that they presented a number of problems about which the widest differences of opinion have existed, the solution of which was by no means simple.

The opinion advanced, and I believe originated, by Haussknecht, that the seeds of *Epilobium alpinum* L. and *E. Hornemanni* Reichenb. are different, has been generally accepted since the publication of his monograph. He says of the seeds of *E. lactiflorum* Hausskn., by which name he calls *E. alpinum*, "testa glabra, lacunoso-impressa," [1] but of the seeds of *E. Hornemanni* he says, "testa tenuiter papillosa." [2] Trelease in his Revision of the Genus Epilobium [3] accepts this view

[1] Haussknecht, Monographie der Gattung Epilobium, 158 (1884).
[2] Ib. 174.
[3] Missouri Botanical Garden Reports, ii, 75–116 (1891).